U.S. Nuclear Regulatory Commission
38th Annual Regulatory Information Conference

RIC2026

Regulation, Innovation and Collaboration for a Safer Tomorrow

March 10-12, 2026

Bethesda North Marriott Hotel
and Conference Center
Rockville, MD

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Cybersecurity Enhancements

Office of Nuclear Security and Incident Response

Overview

Modifications related to cybersecurity to address the ADVANCE Act and EO 14300 5(g) (Reforming and Modernizing the NRC's Regulations)

- New/Revised Cybersecurity Inspection Procedures
  - Enhance clarity and effectiveness
  - Enable the future: nuclear plant restarts and advanced reactor technologies
- Research to Prepare for the Future
  - Ensure safety and security as technology evolves

Topics

- Cybersecurity Inspections
  - Operating Fleet
  - Restarts
  - Construction
- Preparing for the Future
  - Zero-Trust Architecture
  - Cloud Computing
  - Artificial Intelligence
  - Autonomous Operations

Risk-Informing Operating Fleet Inspections

Goal: Incorporate lessons learned and balance the level of resources with safety significance.

- Changed from biennial -> triennial inspection cycle
- Streamlined information-gathering process
- Incorporated risk-informed and consequence-based guidance to aid the selection of critical digital assets (CDAs)

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Enabling Safe, Efficient Plant Restarts

Goal: Ensure nuclear facilities reestablishing operating licenses have implemented cybersecurity programs that meet regulatory requirements.

- Changed from one-time inspections -> prefuel and postfuel inspections
- Aligned information-gathering process with the operating fleet
- Incorporated risk-informed and consequence-based guidance to aid CDA selection

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Supporting the Inspections of New Reactors

Goal: For diverse reactor designs and novel cyber technologies, including those for **advanced reactors** and **small modular reactors,** verify the implementation of cybersecurity program requirements by—

- Changing from one-time inspections -> prefuel and postfuel inspections
- Identifying critical systems for inspection
- Using information-gathering process aligned with the operating fleet

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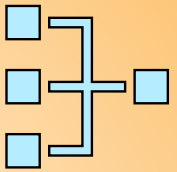
Zero-Trust Architecture (ZTA)



Reactors may adopt technologies such as remote access and autonomous operations that could jeopardize the current perimeter-based cybersecurity architecture. ZTA is a new paradigm that moves security from perimeter defense to focus on users, assets, and resources.

The NRC staff has published research on how ZTA could be implemented in nuclear facilities.

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Cloud Computing

Nuclear facilities may wish to use cloud services to manage CDAs and data across locations.

The NRC staff is conducting research on how cloud-based technology could be implemented safely and securely to mitigate the potential increased risk of third-party vulnerabilities. Research will potentially be used to inform future guidance.

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Artificial Intelligence (AI)

The nuclear industry has expressed a growing interest in using AI to improve operational performance and mitigate operational risk.

The NRC staff has published research on how AI and machine learning could be used to assist in cybersecurity event analysis.

The NRC staff is researching additional benefits and risks of AI as part of the cybersecurity infrastructure.

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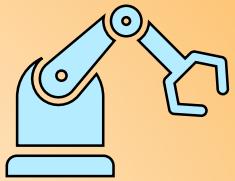
Autonomous Operations



Future reactors may use autonomous systems to perform tasks without direct human control, potentially reducing staffing costs.

The NRC staff has published research on a potential framework to characterize autonomous systems. The staff is continuing to conduct broader evaluations and research on the operational and cybersecurity risks associated with the use of autonomous systems.

Inspection Procedures

See the QR code for links to the inspection procedures (IPs).

Cyber IPs include—

- IP 71130.10—Operating Fleet
- IP 81000.12—Pre-Fuel-Load Restart
- IP 81000.13—Post-Fuel-Load Restart
- IP 75100.09—Prefuel Construction (Future)
- IP 75100.15—Post-Fuel-Load Construction (Future)

Contacts

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Ongoing and future research

See the QR code on the right for links to the research topics:

- Zero-Trust Architecture (ZTA)
- Cloud Computing
- Artificial Intelligence (AI)
- Autonomous Operations

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